INDEX

	Page
Opinion below	1
Jurisdiction	1
Question presented	2
Constitutional and statutory provisions involved	2
Statement	3
Reasons for granting the writ	7
Conclusion	15
Appendix A	17
Appendix B	32
Appendix C	33
Appendix D	36

CITATIONS

Cases:

Baker v. *Selden*, 101 U.S. 99	9
Brenner v. *Manson*, 383 U.S. 519	2, 9, 11
Burr v. *Duryee*, 1 Wall. 531	9
Cochrane v. *Deener*, 94 U.S. 780	10, 11
Fuller v. *Yentzer*, 94 U.S. 288	9
Graham v. *John Deere Co.*, 383 U.S. 1	9, 11, 14, 15
Halliburton Oil Well Cementing Co. v. *Walker*, 146 F. 2d 817	12
Don Lee, Inc. v. *Walker*, 61 F. 2d 58	11, 12
Le Roy v. *Tatham*, 14 How. 156	9
Mackay Radio & Telegraph Co. v. *Radio Corporation of America*, 306 U.S. 86	9
Application of Foster, 438 F. 2d 1011	11
Application of Musgrave, 431 F. 2d 882	11
O'Reilly v. *Morse*, 15 How. 62	9
Application of Prater and Wei, 415 F. 2d 1378	11
Application of Shao Wen Yuan, 188 F. 2d 377	10
Risdon Iron and Locomotive Works v. *Medart*, 158 U.S. 68	9
Tilghman v. *Proctor*, 102 U.S. 707	9

tiorari to October 3, 1971. The jurisdiction of this Court is invoked under 28 U.S.C. 1256. *Brenner* v. *Manson*, 383 U.S. 519.

QUESTION PRESENTED

Whether a method of converting numerical information from binary coded decimal numbers into true binary numbers, for use as an operational program in conventional general-purpose digital computers, is patentable.

CONSTITUTIONAL AND STATUTORY PROVISIONS INVOLVED

Article I, Section 8, clause 8, of the Constitution of the United States provides:

> The Congress shall have Power * * *
>
> * * * * *
>
> To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;

35 U.S.C. (1964 ed.) 100(b) provides:

> The term 'process' means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.

35 U.S.C. (1964 ed.) 101 provides:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

STATEMENT

The issue in this case is whether respondents are entitled to a patent on a method which they have claimed for programming a general purpose digital computer. A digital computer operates essentially by choosing between two alternatives. The necessary choices are made by the opening and closing of electric switches, by varying voltages or currents in circuits, or by other electronic methods. The process is controlled by arranging a system of signals, in the proper sequence, in a form compatible with the computer's characteristics, for example, by recording them on punched cards or magnetic tapes. The arrangement of signals is the "program," "a sequence of coded instructions for a digital computer" (Webster's Third New International Dictionary). Programs are ordinarily recorded or "coded" by means of the binary number system, a method of numerical representation using only two digits—"0" and "1". The binary number system is used because the two symbols may be readily correlated with the electronic choice between two alternatives.

The respondents seek a patent on a method of converting "signals" or "numerical representations" from binary coded decimal form into binary form. A brief description of the binary number system will be helpful in describing their claim.

Decimal notations are commonly used to indicate numerical representations. The decimal system uses

the digits 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0, arranged so that the numerical value of any digit depends on its position in the number. The positional values increase in sequentially ascending powers of 10 from right to left. Thus decimal numbers are written by placing digits in the appropriate column, *i.e.*, "units," "tens" (10^1), "hundreds" (10^2), "thousands" (10^3), etc.

The binary notation system could be described as the way man might count if he had only two fingers. Its two digits, "1" and "0", are placed in positions with values based on sequentially ascending powers of 2 which increase from right to left just as the place values of decimal numbers increase in sequential powers of 10. When "1" fills a position it symbolizes 2 to the power for that position; when "0" fills it, the position has no value. The place to the right of the position for 2^1 is used to distinguish between odd and even numbers. When this place is filled with "1" the combination of digits describes an odd number; when it is filled with "0" it describes an even number.

All numbers between 1 and 10 can be described in the binary system with four positions. Thus the following table can be compiled:

Decimal		Factored as Power of 2		Binary
0	=	0	=	0000
1	=	$0+1$	=	0001
2	=	2^1	=	0010
3	=	$2+1$	=	0011
4	=	2^2	=	0100
5	=	$2+1$	=	0101
6	=	$2+2^1$	=	0110
7	=	$2+2+1$	=	0111
8	=	2^3	=	1000
9	=	$2+1$	=	1001
10	=	$2+2^1$	=	1010

Decimal numbers can be written in binary decimal form by converting each component digit in its decimal position to a four-digit binary number. In this form they are called binary coded decimals (BCD). The value of each four-digit BCD number depends on its decimal position. Thus BCD numbers are a hybrid between the decimal and binary systems. For example, 53 in BCD is 0101 0011 because 5 equals $2^2+1=0101$, and 3 equals $2^1+1=0011$. In true binary form, however, in which decimal place values are not used, 53 equals $2^5+2^4+0+2^2+0+1=110101$.

For some computer operations it is necessary to convert from the binary coded decimal system to the true binary system. The method for doing this is what respondents claim in their patent application. Claims 8 and 13 of their application are the only claims in issue here.[1]

---

[1] Claim 8 reads:

"The method of converting signals from binary coded decimal form into binary which comprises the steps of—

(1) storing the binary coded decimal signals in a reentrant shift register,

(2) shifting the signals to the right by at least three places, until there is a binary "1" in the second position of said register,

(3) masking out said binary "1" in said second position of said register,

(4) adding a binary "1" to the first position of said register,

(5) shifting the signals to the left by two positions,

(6) adding a "1" to said first position, and

(7) shifting the signals to the right by at least three positions in preparation for a succeeding binary "1" in the second position of said register."

Claim 13 reads:

"A data processing method for converting binary coded

The conversion of binary coded decimal numbers can be accomplished by a series of conventional mental steps through the use of a chart showing binary equivalents of decimal binary numbers between 1 and 10 (see chart on p. 4, *supra*), and by the mathematical processes of addition and multiplication (see App. C, *infra*, pp. 33–35). The respondent applicants vary the conventional steps by changing the order in which they are accomplished and the multiplier used in some steps, and by using sub-totals after each successive operation. No new machinery or hardware is necessary to complete the series of logical steps described. The mathematical procedures recited in their claims can be carried out in existing computer inventions used before the respondents' procedure was calculated; they can also be performed without a com-

---

decimal number representations into binary number representations comprising the steps of—

(1) testing each binary digit position *i*, beginning with the least significant binary digit position, of the most significant decimal digit representation for a binary "0" or a binary "1";

(2) if a binary "0" is detected, repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;

(3) if a binary "1" is detected, adding a binary "1" at the (i+1)th and (i+3)th least significant binary digit positions of the next lesser significant decimal digit representation, and repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;

(4) upon exhausting the binary digit positions of said most significant decimal digit representation, repeating steps (1) through (3) for the next lesser significant decimal digit representation as modified by the previous execution of steps (1) through (3); and

(5) repeating steps (1) through (4) until the second least significant decimal digit representation has been so processed."

puter as the respondents showed before the Patent Office (see appendix C, *infra*, pp. 33–35).

The Patent Office examiner rejected claims 8 and 13 as unpatentable subject matter under 35 U.S.C. 101 on the ground that the computer program described in the claims, essentially a series of mathematical calculations or mental steps, was not a "process" within the statutory definitions of 35 U.S.C. 100(b). The Patent Office Board of Appeals affirmed the examiner's decision.

The Court of Customs and Patent Appeals reversed, holding that the computer program described in the claims qualified as a process within the statutory definition (App. A, *infra*). Citing with approval a dictum contained in one of its own recent decisions to the effect that "in reality very little remains * * * of the 'mental steps' doctrine," the court noted that even though the "workstuff of the method is numbers which are mathematical abstractions," the processes in question would almost certainly be implemented by machines; therefore, the court reasoned, the processes were really within the "technological" or useful arts. App. A, *infra*, pp. 27–31.

REASONS FOR GRANTING THE WRIT

The decision of the Court of Customs and Patent Appeals in this case effectively rules for the first time that a method of data processing which can be performed by a general purpose digital computer constitutes patentable subject matter, and raises over the still developing computer software field the threat

that general use of mathematical procedures involved in computer programming may become foreclosed by patent monopolies. The decision conflicts with rulings of this Court and of the courts of appeals that mathematical theories and mental steps are not patentable; it will have great impact on the computer industry and thus on the economy at large; and it presents extremely serious administrative problems for the Patent Office. To await infringement litigation to test the validity of patents on computer programs would create serious and costly uncertainty in the computer industry and the Patent Office. Certiorari should be granted now to resolve the important question raised by the decision below.

1. As shown in the statement, *supra*, and in Appendix C, *infra*, the "process" involved here is nothing more than an arrangement of arithmetical calculations, analogous, for example, to the conversion of Roman into Arabic numerals. In effect, respondents' application merely claims a procedure for applying familiar mathematical steps and principles to solve the problem of converting decimal numbers into the binary numbers used in digital computers. This is not the kind of "Discovery" contemplated either by the patent clause of the Constitution or by Section 101 of the Patent Code.

The underlying rationale of the limitations on patentability contained in these provisions is that ideas—scientific principles, mental processes, and abstract intellectual concepts—are the basic instruments of scientific and technological development, and, their free exchange is not to be hindered by the

granting of patent monopolies. (See the selections from letters of Thomas Jefferson quoted in *Graham* v. *John Deere Co.*, 383 U.S. 1, 8, n 2.) The binomial theorem or La Place's equations, even though the product of great intellectual effort, would not be patentable. The patent system is, instead, directed to the pragmatic application of such concepts to matter in new and useful ways. *Brenner* v. *Manson*, 383 U.S. 519. What is patentable is the application of abstract concepts to material inventions. If the concepts themselves or combinations of them were subject to the patent monopoly, scientific and technological creations could become stultified, because the very ideas which constitute the currency of intellectual development and exchange would be foreclosed.

This Court has repeatedly ruled that a scientific principle, rule, formula or mathematical expression is not a patentable process, regardless of the novelty or importance of the discovery. *Le Roy* v. *Tatham*, 14 How. 156, 174; *Mackay Radio & Telegraph Co.* v. *Radio Corporation of America*, 306 U.S. 86, 94; see also *O'Reilly* v. *Morse*, 15 How. 62; *Tilghman* v. *Proctor*, 102 U.S. 707; *Risdon Iron and Locomotive Works* v. *Medart*, 158 U.S. 68. Cf. *Burr* v. *Duryee*, 1 Wall. 531, 570; *Fuller* v. *Yentzer*, 94 U.S. 288; *Baker* v. *Selden*, 101 U.S. 99, 103. Although the court below emphasized that the methods involved in respondents' claims would almost certainly be implemented by computers, and thus did not explicitly reject the reasoning of these decisions, the court rec-

ognized that, in *fact*, "[t]he claims in this case are directed solely to the art of data processing itself" (App. A, *infra*, p. 25), and no subsidiary or additional art is necessary to implement the methods claimed. Indeed, as the court recognized, the processes involved in a computer program, including those claimed here, can be implemented with any kind of equipment which enables one to convert binary code decimal representations into binary number representations. As the court noted, "This could *in theory* be any kind of writing or even, we suppose, red and blue poker chips and a surface to put them on or slots to put them in so that 0's and 1's can be represented." App. A, *infra*, p. 30. We submit that the decision of the Court below makes no viable distinction between the subject of respondents' claims and pure mental processes, and is thus inconsistent with the cited decisions of this Court.

The instant case appears to be the last of a series of decisions by which the Court of Customs and Patent Appeals has eroded the long standing administrative and judicial doctrine, previously accepted by that court, that "purely mental steps do not form a process which falls within the scope of patentability as defined by statute." *Application of Shao Wen Yuan*, 188 F. 2d 377, 380 (C.C.P.A.).

The term "process" as used in Section 101 of the Patent Code, and as interpreted by the Patent Office, reflects the concepts articulated in this Court's decision in *Cochrane* v. *Deener*, 94 U.S. 780,

788,' and ultimately the concept of "discoveries" to which the patent clause of the Constitution applies. Cf. *Brenner* v. *Manson*, 383 U.S. 519, 534; *Graham* v. *John Deere Co.*, 383 U.S. 1, 5–6. In *Application of Musgrave*, 431 F. 2d 882, the Court of Customs and Patent Appeals suggested that decisions of this Court subsequent to *Cochrane* (see *Application of Prater and Wei*, 415 F. 2d 1378 (C.C.P.A.)) had altered the standards set forth in *Cochrane*. The court held in *Musgrave* that a process is patentable if it is in the "technological arts." Subsequently in *Application of Foster*, 438 F. 2d 1011, 1015, the court below ruled that "[I]t is not important whether the claims contain mental steps or not if the process is within the technological arts." The instant case completes this trend by awarding patents for the mental and mathematical calculations involved in computer programming.

The decision below also conflicts with the decision of the Ninth Circuit in *Don Lee, Inc.* v. *Walker*, 61 F. 2d 58, in which the court held unpatentable a method of counterbalancing engine main shafts which

---

'*Cochrane* v. *Deener* defines a patentable process as follows (94 U.S. at 788):

> • • • A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable; whilst the process itself may be altogether new, and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence.

it characterized as "a mathematical formula for the solution of a problem in dynamics." 61 F. 2d at 59. Similarly, in *Halliburton Oil Well Cementing Co.* v. *Walker*, 146 F. 2d 817, the Ninth Circuit struck down a claim on a method for locating an obstruction in a well on the ground that the method amounted to no more than a process for "setting down three knowns in a simple equation and from them determining or computing an unknown." 146 F. 2d at 821. In both of these cases, as here, the mental and mathematical processes were clearly intended to be implemented by machinery. The reliance of the court below on this factor does not reconcile its decision with those of the Ninth Circuit and with the cited rulings of this Court.[1]

2. The decision below, if allowed to stand, will have a serious impact upon the computer industry. The pat-

---

[1] The Canadian Patent Office has instructed its Patent Examiners that computer programs are not patentable under Section 2(d) of the Canadian Patent Act:

"It [a patent] must not be for a computer programme, an algorithm, or a set of instructions to operate a computer. Similarly it may not be for a known or general purpose computer programmed in a particular way to produce a particular result. Under this criteria [sic] software such as punched cards or tapes carrying programmes and some hardware would be excluded. It is considered that the development of computer programmes falls within the expected skill of competent programmers, and as such lacks the requirement of non-obviousness. Furthermore, programmes in whatever form they may be presented, are essentially mathematical information developed from an algorithm and set forth in the form of a set of instructions. As such they are not allowable under Section 2(d)." The

Patent and Trademark Institute of Canada, Newsletter #36, August 9, 1971.

entability *vel non* of programming vitally affects a technology which permeates the economy and which involves great financial investment. Use of general purpose digital computers is increasing rapidly;[4] in 1969 there were more than 65,000 computer installations in the United States; at present there are approximately 250,000 active computer programs.[5] It is estimated that the annual cost of "programming" or "software" equals 30 percent of the purchase value of the trade inventory.[6] This may amount to $15 billion

---

[4] Encyclopaedia Britannica (1970 ed.), Vol. 12, p. 244B, states under "Information Processing * * * 4. Computer Industry," that:

> The original purchase price of the 62,000 general-purpose digital computers manufactured by the United States companies during the decade ending in 1967 totalled more than $20,000,000,000, including $6,000,000,000 for those made in 1967 alone. * * * If the trend continued, by the mid-1970s there would be 200,000 U.S.-manufactured computers in use throughout the world, originally costing a total of $100,000,000,000 with about half the total number and total value at installations in the U.S.

[5] Reports on the DP [Data processing] Industry, DP Focus, August 1970, at 274; Communications of the ACM [Association for Computing Machinery], Vol. 14, No. 3, at 201 (March, 1971), reprinting statement made by Walter Carlson, President of ACM at hearing conducted by the U.S. Department of Labor, Wages and Hours Division.

[6] "Annual operating costs for computing systems ('hardware') include maintenance costs and the amortized purchase price, typically on a 3–4 year useful life basis, commonly called the hardware cost. About an equal amount is required to cover 'software' costs—software refers to the many kinds of computer programs required for computer systems, each program also

(Footnote contd. top of p. 14)

with a short useful life. Hardware and software costs, taken together, total annually about 60% of the purchase value of the hardware inventory." Encyclopaedia Britannica (1970 ed.), Vol. 12, p. 244B.

for installations in the United States by the middle of this decade. To protect themselves from the legal uncertainties created by this decision, software firms will have to undertake the expense of acquiring patents and licenses. Even if these steps are taken, it will be virtually impossible to dispel the threat of infringement litigation. Since virtually all users of computers prepare some of their own programs, the class of persons adversely affected by this decision, including both programmers and users, will be very large.

The decision below could also produce enormous problems in the administration of the patent program. The 1966 Report of the President's Commission on Patent System (reprinted in S. Doc. No. 5, 90th Cong., 1st Sess., p. 21) recommended that computer programs not be patented,[7] in part because it is questionable whether an effective system for the examination of computer programs can be developed. No adequate classification, technique or research files exist, and, as the Commission observed, "Even if these were available, reliable searches would not be feasible or economic because of the tremendous volume of prior art being generated" (*ibid.*). For this reason, it is doubtful that the criteria for examination of patent

[7] Legislation to implement this recommendation was introduced in the patent revision bill embodying the report's proposals. See Section 106, S. 1042, 90th Cong. 1st Sess. However, the proposal is not contained in the current patent revision bill, S. 643, 92d Cong., 1st Sess.

applications required by *Graham* v. *John Deere, supra,* 383 U.S. at 18–19, can be effectively applied to applications for patents on computer programs. Rather, under the instant decision, patents issued on such applications may be little more in fact than registrations, which must await the test of infringement litigation. As stated in *Graham* v. *John Deere, supra,* "[t]o await litigation is—for all practical purposes—to debilitate the patent system", 383 U.S. at 18. The question of the patentability of computer programs should be definitely resolved now.

CONCLUSION.

For the foregoing reasons, the petition for a writ of certiorari should be granted.

Respectfully submitted.

ERWIN N. GRISWOLD,
Solicitor General.
RICHARD W. MCLAREN,
Assistant Attorney General.
HOWARD E. SHAPIRO,
RICHARD H. STERN,
ROBERT H. MORSE,
Attorneys.

WILLIAM N. LETSON,
General Counsel,
Department of Commerce.
S. WILLIAM COCHRAN,
Solicitor.
JERE W. SEARS,
Associate Solicitor,
United States Patent Office.

OCTOBER 1971.

445-688—71——3

APPENDIX A

United States Court of Customs and Patent Appeals
(October Term, 1970; Patent Appeal No. 8376; Serial No. 315,050)

IN THE MATTER OF THE APPLICATION OF
GARY R. BENSON AND ARTHUR C. TABBOT
May 6, 1971

RICH, Judge.

This appeal is from the January 31, 1968 decision of the Patent Office Board of Appeals[1] affirming the rejection of claims 8 and 13, the only claims remaining in appellants' application serial No. 315,050, filed October 9, 1963, and assigned to Bell Telephone Laboratories Incorporated, entitled "Conversion of Numerical Information." We reverse.

THE INVENTION

The invention of the appealed claims is in the field of computer technology and relates to data processing systems. The claims are both directed to methods. The opening sentence of the specification states that the invention relates to the processing of data by program and more particularly to the programmed conversion of numerical information. The particular conversion to which both of the claims on appeal are directed is the conversion of "binary coded decimal" (BCD) numerical information in the form of "signals" (claim 8) or "representations" (claim 13) into binary number signals or representations, respectively. Though we

[1] Consisting of Kreek, Keely, and Andrews, Examiners-in-Chief, opinion by Andrews.

presume this statement would be an adequate explanation to those skilled in the computer art, for the benefit of those not so skilled we will elucidate further.

Most ditigal computers perform their computing operations on information in binary form, a system of representation having only two elementary constituents, called "bits," indicated by "1" and "0". Men, on the other hand, are accustomed to quantitative information in decimal form and, for the computer to work on or utilize it, it must be converted into binary form. It has become a general practice to make this conversion in two stages: from decimal to BCD; from BCD to binary. The following table shows the ten familiar decimal digits and their binary equivalents expressed in groups of four bits:

Decimal:	*Binary*
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

In BCD notation the decimal number 53 would be represented as 0101, 0011, the binary form of 5 followed by the binary form of 3, each group of four bits being a BCD "digit." Although the BCD notation is in terms of "1" and "0" only and can be represented in a binary machine, it is not in a form in which the machine can utilize it to perform its computing operations. In true binary the decimal number 53 is represented by 110101. The problem is to convert the intermediate BCD representation into the true binary. Various ways of doing this were known prior to appellants' invention. They claim to have

discovered a better and simpler way of doing it having various advantages recited in the specification such as reducing the number of steps required to be taken, dispensing with the repetitive storing and retrieval of partially converted information, eliminating the need for interchanging signals among various equipment components and the need for auxiliary equipment, and decreasing the chance of error.

The digital computer which is to receive the information in BCD form can itself be programmed to convert it into binary form. The specification gives as an illustrative example an actual program for converting a binary-coded decimal number to ordinary binary and apparatus is described in conventional block diagram form in which the program can be carried out.

The two claims on appeal read as follows:

> 8. The method of converting signals from binary coded decimal form into binary which comprises the steps of
>
> (1) storing the binary coded decimal signals in a reentrant shift register,
>
> (2) shifting the signals to the right by at least three places, until there is a binary "1" in the second position of said register,
>
> (3) masking out said binary "1" in said second position of said register,
>
> (4) adding a binary "1" to the first position of said register,
>
> (5) shifting the signals to the left by two positions,
>
> (6) adding a "1" to said first position, and
>
> (7) shifting the signals to the right by at least three positions in preparation for a succeeding binary "1" in the second position of said register.
>
> 13. A data processing method for converting binary coded decimal number representations

into binary number representations comprising the steps of

(1) testing each binary digit position *i*, beginning with the least significant binary digit position, of the most significant decimal digit representation for a binary "0" or a binary "1";

(2) if a binary "0" is detected, repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;

(3) if a binary "1" is detected, adding a binary "1" at the (i+1)th and (i+3)th least significant binary digit positions of the next lesser significant decimal digit representation, and repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;

(4) upon exhausting the binary digit positions of said most significant decimal digit representation, repeating steps (1) through (3) for the next lesser significant decimal digit representation as modified by the previous execution of steps (1) through (3); and

(5) repeating steps (1) through (4) until the second least significant decimal digit representation has been so processed.

As to these claims, no prior art is cited and no question is raised as to utility, novelty, or unobviousness. The asserted advantages and the implicit advance resulting therefrom in the data-processing art have not been questioned.

THE REJECTION

The first problem it is necessary to settle is what the ground or grounds of rejection is or are. Appel-

lants' brief correctly states, "The only explicit rejection outstanding against claims 8 and 13 is the rejection on the grounds [sic] that these claims are directed to subject matter not embraced by Section 101." Study of the two Examiners' Answers makes it clear that that was the only ground he relied on. In his first Answer the Examiner specified that "all grounds of rejection are withdrawn *except* the art rejections and nonstatutory subject matter rejections." We no longer have any art rejections. In his second Answer, on remand, he said:

> In summary, the remaining ground of rejection of claims 8 and 13 now in the case is that these claims are directed to non-statutory subject matter.

In reciting what the rejection was, the board opinion says:

> Claims 8 and 13 stand rejected as for subject matter not embraced by 35 U.S.C. 101 in that they set forth "mental processes" and "mathematical steps," neither being an "art" as construed by a long line of decisions * * *.

Nowhere does the board opinion indicate that any new ground of rejection is being made.

In discussing appellants' arguments traversing the contention that the claims are directed to non-statutory subject matter, the board, answering the argument that "The only way applicants' claims can be construed to include mental steps is to construe them contrary to the disclosure rather than in accord therewith," made the following somewhat off-the-point observations:

> We are not convinced by appellants' arguments to the effect that the disclosure in an application, not the claims thereof, should be the proper basis for judging whether the claims

> are drawn to subject matter outside the statute. Certainly a claim which embraces that which was already in the prior art or was obvious therefrom could not be sustained under 35 U.S.C. 102 or 103 merely because there may have been something patentable disclosed in the specification. *35 U.S.C. 112* [2d par., 1st sentence] *requires the claim to point out the subject matter which the applicant regards as his invention so that a claim which is so broad and indistinct as to embrace within its terms subject matter that can not be patented under section 101 of the statute, similarly must be unpatentable.* [Emphasis ours.]

While from that point on in its opinion the board discussed the breadth of the claims and what in its opinion they cover, it never so much as suggested that the claims are "indistinct" or do not point out "the subject matter which the applicant regards as his invention." The board did not again refer to section 112 nor in any way suggest failure of the claims to comply with the second paragraph of that section and merely affirmed the rejection on the ground that the claims, as it read them, were directed to methods which are non-statutory under section 101. It is our opinion that up until the time of the appeal to this court there was only one ground of rejection relied on and that was non-compliance with section 101.

However, apparently out of an abundance of caution and noting the board's reference to section 112 in the above-quoted passage, as well as a similar passage in the Examiner's Answer on Remand,[1] appel-

---

[1] Continuing the statement quoted above as the first quotation in this section, the examiner said:

> The method set forth is by applicants' own assertion "directed to a machine algorithm"; and as understood recites

lants' main brief, toward its end, says of the italicized passage in the above quotation from the board's opinion that it could be construed as another example similar to the sections 102 and 103 example preceding, *or it could also be construed as an entirely new ground of rejection under section 112*, simultaneously deploring the "vagaries of prosecution [which] leave some of the basic issues in doubt." Appellants thereupon spent a page of their brief stating their reasons why a rejection under the second paragraph of section 112, *if* such had been made, would be in error. That would seem a cautious thing to do but it does not bring such a rejection into the case unless it was already there.

The brief for the Patent Office trades heavily on this situation. On page 2 it quotes appellants as saying that they "have no alternative but to consider a rejection under Section 112 as having been raised and requiring a response" and proceeds to the conclusion that "A rejection under 35 U.S.C. 112, 2nd paragraph, would thus also appear to [be] present," pointing out that a reason of appeal in appellants' Notice of Appeal alleges that the board erred

---

a series of steps for manipulation of data required to be carried out by a programmed computer. Such a method, set forth in this manner, is not considered to properly set forth a process within the meaning of 35 USC 101, in light of prior decisions and the requirements of 35 USC 112. The subject matter of the claims is thus deemed non-statutory.

That paragraph by the examiner therefore begins and ends with the summary statement of his position that *the* single ground of rejection is that the claims are directed to non-statutory subject matter under 35 USC 101. In short, a method carried out by a programmed computer is non-statutory. His reference to section 112 is not clear as to its purpose and seems superfluous.

> * * * in sustaining the Examiner's rejection of claims 8 and 13 as failing to point out the subject matter which appellants regard as their invention under 35 U.S.C. 112 in that the claims are so broad and indistinct as to embrace within their terms subject matter that can not be patented under 35 U.S.C. 101.

This, it will be seen, is a close paraphrase of what the board said in the paragraph quoted above. It was an appropriate reason of appeal to file to cover the contingency that what the board said might be a new ground of rejection. The Patent Office brief goes on to argue, it would seem as its *principal* contention,[4] not that the claims are directed to non-statutory subject matter because directed to mental or mathematical steps, which do not constitute an "art,"[5] *but* that "the rejection under 35 U.S.C. 112 should be affirmed" because appellants admitted during prosecution that their process is capable of manual implementation with the aid of pencil and paper, that this is "beyond that which they presently regard as their invention," and that the claims must be rejected *under section 112* by reason of our decision in *In re Prater and Wei*, 56 CCPA 1381, 415 F. 2d 1393, 162 USPQ 541 (1969).

---

[4] More than 5 of the 7 pages of argument are devoted to this point. The brief begins by stating, however, that

> The principal rejection, of course, is that "[c]laims 8 and 13 stand rejected as for subject matter not embraced by 35 U.S.C. 101 in that they set forth 'mental processes' and 'mathematical steps,' neither being an 'art' . . ."

[5] The term "art," of course, is the term used in the statutes prior to 1953, the term now being "process" (35 USC 101) which is defined to include "art or method" (35 USC 100(b)). The board used the term "art" because it was referring to a number of pre-1953 cases which dealt with the meaning of that term in R.S. 4886, old Title 35 USC, section 31.

We have decided a number of cases in the general field of computer science in addition to the *Prater* case, supra, since the briefs in this case were filed which we list here for convenient reference:

In re Bernhart, 57 CCPA 737, 417 F. 2d 1395, 163 USPQ 611 (1969).

In re Mahony, 57 CCPA 939, 421 F. 2d 742, 164 USPQ 572 (1970).

In re Musgrave, 57 CCPA 1352, 431 F. 2d 882, 167 USPQ 280 (1970).

In re Foster, 58 CCPA ——, — F. 2d —, 169 USPQ 99 (1971).

This is an appropriate place to point out a significant difference between most of those cases and the present case. The claims in this case are directed solely to the art of data-processing itself whereas in most of the above cases some subsidiary or additional art was involved. In *Bernhart* it was "Planar Illustration Method and Apparatus" by which two-dimensional illustrations of three-dimensional objects could be produced; in *Mahony* we were concerned with data-processing itself in that the invention was a method of locating the framing bits in a bit stream; in both *Musgrave* and *Foster* computers were used to process seismograms; and in *Prater* the invention related to the spectrographic analysis of gases. All of the above cases and the present case have in common, however, the fact that they are the outgrowth of a blanket Patent Office policy, which remained in existence for some time after the decision of the board in this case, to deny claims such as those before us here on the ground that they were not for statutory sub-

ject matter.[5] This policy was later modified.[6] The decision here for review is a typical product of its time.

Reverting now to the first problem which confronts us, what rejection do we have before us for decision? We conclude, appellants' apprehension notwithstanding, that the examiner and the board relied on only one ground, predicated on 35 USC 101, that claims 8 and 13 are either directed to or at least embrace nonstatutory subject matter. Neither of them complained that the claims are unclear, ambiguous, indistinct, or otherwise incomprehensible so as not to comply with section 112, second paragraph. In *Mahony* we made it clear that "To inject any question of statutory subject matter into that paragraph is to depart from its wording and to complicate the law unnecessarily." The solicitor's attempt to build up a rejection on section 112 in order to defeat appellants under the second *Prater* case decision—a decision not rendered until five months after appellants filed their main brief in this court—must fail. It would have to fail in any case for, as appellants point out in their reply brief, in *Prater* appellants admitted in the course of the appeal that their claims read on a mental step implementation and we based our decision on that admission insofar as we affirmed the rejection, whereas here appellants have made no such admission and, for reasons

[5] For a full exposition of that policy see the speech of Commissioner of Patents Brenner of October 22, 1968, which is part of the proceedings of that year of the Computers-in-Law Institute, National Law Center, George Washington University, section B-1, entitled "The Future of Computer Programs in the U.S. Patent Office."

[6] See the speech by Commissioner Schuyler, October 8, 1969, 1969 Computers-in-Law Institute, Section H, entitled "Protecting Property in Computer Software."

hereinafter stated, we do not think the claims read on any "mental step" implementation.

We turn then to consideration of what the solicitor's brief admits is the "principal rejection" predicated on section 101, which we find to be the only rejection.

CLAIM 8

We have set forth claim 8 above and have stated that the examiner and board rejected it because they considered it to be directed to "mental processes" and "mathematical steps." The reasoning of the board's opinion bears a remarkable similarity to the opinion of the board in *Musgrave*, which is not surprising since it was the same board and the opinion was by the same member. The same line of cases is relied on here that was relied on in *Prater* and *Musgrave* and we have given them full consideration before, particularly in those two cases in which we considered at length the "mental steps" doctrine. One of the many sound ideas expressed in the concurring opinion delivered by Judge Baldwin in *Musgrave* is "that in reality very little remains [as a result of our recent decisions] of the 'mental steps' doctrine." Another is that as a result of *Prater* and *Mahony*—if, indeed, it has not always been so[1]—there is a "standard of reasonableness" in the interpretation of claims which is that they should be given the meaning they would have "to one of ordinary skill in the pertinent art when read in light of and consistently with the specification."

---

[1] See "Patent Claims" by Ridsdale Ellis (1949), Chapt. 3 entitled "General Rules of Claim Construction" especially Secs. 21, 22 referring to reasonableness in claim interpretation and citing decisions of the Court of Appeals for the District of Columbia in 1924 and 1915.

The question Judge Baldwin asked in *Musgrave* is the question we have here: "* * * would a *reasonable* interpretation of the claims include coverage of the process implemented by the human mind?" The answer clearly is "No," for the same reasons it had to be "No" in *Mahony* and in *Musgrave*. Claim 8 is for a method to be practiced in part on particular *apparatus* specified to be a "reentrant shift register." The first sentence of a three-paragraph definition of "shift register" in the "Condensed Computer Encyclopedia" edited by Jordain, McGraw-Hill Book Co. (1969), is: "A hardware element constructed so as to perform the shifting of its contained data." At argument, the Patent Office Solicitor admitted that the reference to this piece of apparatus in the claim was, for him, its "most embarassing phrase." It is not only a phrase, it is referred to expressly in elements (1), (2), (3), (4) and (7) and by implication in element (5) which refers to "shifting." Claim 8, moreover, refers to the operations of storing, shifting, and masking "signals" which, by a *reasonable* interpretation in the light of the specification, can only mean signals of the kind upon which the disclosed electronic digital computer hardware operates. The signals are like the "bits" and "bit streams" with which we were concerned in *Mahony*. Claim 8 therefore covers only a machine-implemented process and the apparatus for carrying it out has been disclosed. The process can be carried out with no intervention by a human being once the apparatus is set up—that is to say, the appropriate computer system has been assembled and programmed. The solicitor would have us hold the method is not a "process" within section 101 on the ground that a programmable computer is merely a "tool of the mind" and the method is basically "mental" in character, apparently because the "workstuff"

of the method is numbers which are mathematical abstractions. As the Patent Office would say, we do not find the argument persuasive. Cash registers, bookkeeping machines, and adding machines also work only with numbers but this has never been considered a ground for taking them out of the "machine" category of section 101.

CLAIM 13

This claim was rejected on the same ground as claim 8 from which it differs in containing no reference to any apparatus and in referring to the thing operated upon not as "signals" but as "representations." The claimed method is one for coverting "binary coded decimal number representations" into "binary number representations." The supporting disclosure against which the claim must be reasonably interpreted is the identical programmed digital computer system which supports claim 8. The operational steps to be carried out call for "testing each binary digit position" to determine whether it is a "binary '0' " or a "binary '1' " and performing a specified act according to what is found, i.e., moving to the next position if it is "0" and repeating the test or adding a binary "1" at two specified positions and then moving to the next position, and so on, each action being prescribed so that no human judgment or decision is required—merely observation and taking prescribed action according to what is observed. Apparatus, machinery, "hardware"—whatever it may be called—is disclosed by which the steps *can* be carried out without human intervention but at the same time, since the claim does not itself call for any particular hardware, the method within the claim can be practiced either with apparatus other than that described or with the simplest of

equipment which will enable one to provide and to manipulate "binary coded decimal representations" and convert them into "binary number representations." This could *in theory* be any kind of writing implement and any kind of recording medium—"pencil and paper"—or even, we suppose, red and blue poker chips and a surface to put them on or slots to put them in so that "0"s and "1"s can be represented.

It will aid in understanding the terms of claim 13 to state that the discovery which is the essence of appellants' invention was that, for each bit position in BCD digit, conversion can be accomplished by adding a binary "1" to two specific bit positions of the next lesser significant BCD digit and that in normal notation "significance" of bits or digits increases to the left, e.g., in the decimal number "53" the 5 is more significant than the 3. Thus conversion can be carried out by the steps of (1) testing each BCD bit position for all but the least significant BCD digit and (2) for each "1" bit detected, adding a binary "1" to each of two specified bit positions in the next lesser significant BCD digit.

The only argument put forward by the Patent Office for holding claim 13 non-statutory under section 101 is that the method is basically "mental" in character. Looking at the present case in the light of all its circumstances, we observe in claim 13 a process consisting of a sequence of steps which can be carried out by machine implementation as disclosed in the specification, by still another machine as disclosed during the prosecution, and even manually although in actual practice it seems improbable anyone would ever do that, speed measured in milli- or even micro-seconds being essential in the practical utilization of such a

process. Only in the manual performance would it require the operator even to think and then only to the extent necessary to assure that he is doing what the claim tells him to do. In no case is the exercise of judgment required or even the making of a decision as between alternatives.

Realistically, the process of claim 13 has no practical use other than the more effective operation and utilization of a *machine* known as a digital computer. It seems beyond question that the machines—the computers—are in the technological field, are a part of one of our best-known technologies, and are in the "useful arts" rather than the "liberal arts," as are all other types of "business machines," regardless of the uses to which their users may put them. How can it be said that a process having no practical value other than enhancing the internal operation of those machines is not likewise in the technological or useful arts? We conclude that the Patent Office has put forth no sound reason why the claims in this case should be held to be non-statutory.

The decision of the board is *reversed*.

APPENDIX B

United States Court of Customs and Patent Appeals

OCTOBER TERM, 1970—MAY 6, 1971

(In the Matter of the Application of Patent Appeal No. 8376, Gary R. Benson and Arthur C. Tabbot)

Subject Matter: Conversion of numerical information. Serial No. 315,050.

Said appeal having heretofore been brought on to be heard before the court and due consideration thereon having been had, it is ORDERED that the decision of the Board of Appeals be, and the same is hereby, reversed.

I, GEORGE E. HUTCHINSON, Clerk of the United States Court of Customs and Patent Appeals, do hereby certify that the above judgment and the attached opinion are true and correct copies of the judgment and opinion of said United States Court of Customs and Patent Appeals filed the 6th day of May, A.D. 1971, in the above-entitled appeal, as the same remain upon the files and records of said court.

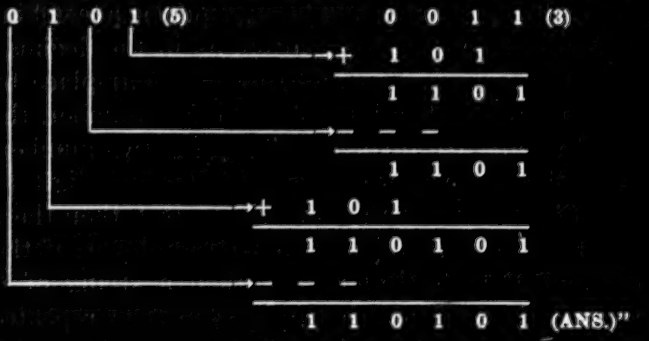
WITNESS my hand and the seal of this court this 7th day of June, A.D. 1971.

GEORGE E. HUTCHINSON,
Clerk.

APPENDIX C

Respondents submitted the following statement to the Patent Office to illustrate a manual way to carry out their method (claim 13):

"Finally, the method represented by these claims can also be carried out by hand, the shifting and adding operations being manual. The example used in the specification can be done by hand as follows:



The conventional process may be explained as follows:

The decimal number 53 in binary decimal form is 0101 0011 and in true binary form is 110101. The conversion may be effected in the following steps:

(1) For the binary equivalent of 5 and 3, consult a chart converting the first ten numbers from decimal to binary form. See Statement, *supra*.

(2) Since decimal $53=(5\times10^1)+(3\times1)$, binary coded decimal 53, which uses the decimal system of place values, must be the binary equivalent of 5 multi-

plied by $10^1{}_d$* plus the binary equivalent of 3 multiplied by 1_d, or ($[0101\times10^1{}_d]+[0011\times1_d]$). When the multipliers $10^1{}_d$ and 1_d are converted to binary numbers we have ($[0101\times1010]+[0011\times0001]$).

(3) To obtain the final true binary expression of 53 all that need be done is to complete the indicated multiplications and addition.

Addition in binary has four possibilities: $0+0=0$; $0+1=1$; $1+0=1$; $1+1=10$, i.e., 0 and "carry" 1, because 10 binary=2 decimal. The multiplication of one-digit binary numbers is even simpler: $1\times1=1$; any other combination, such as 1×0 or 0×0, yields 0. To multiply larger numbers requires a combination of addition and multiplication, as in the decimal system. For example, to multiply one four-place binary number by another four-place binary number, the following steps are involved: First, the two numbers are written, one over the other. If the last digit (least-significant digit of the multiplier) is *1*, then the product, *i.e.*, the multiplicand, is written down; if the last digit of the multiplier is *0*, then a string of *0*'s is written down. The same process is then repeated for the next to the last digit of the multiplier, with the results shifted one position to the left; and for the third from the last digit of the multfplier, with the results shifted another space to the left. Finally, the process is repeated with the first digit (that in the most-significant digit position), with still another position shift to the left. The answer is the sum of these results.

Applying this process to the multiplication of the decimal number 10 by decimal 5, which is equivalent

*The subscript "d" symbolizes a decimal number. Similarly, the subscript "b" symbolizes a binary number.

to multiplying binary 1010 by binary 0101, the following steps are taken:

```
  1010
 ×0101
------
  1010
 0000
1010
000
------
110010.
```

Since 3 x 1=3 it is unnecessary to perform this step. Instead, the binary equivalent of 3 (0011) is simply added directly to the binary equivalent of 50 (110010) computed above:

```
  110010
+   0011
--------
  110101.
```

The program claimed by the applicants constitutes the foregoing steps, described and translated into computer language. As the illustration of the applicants' method discloses, they prescribed the steps recited above, with only the following differences:

(1) Decimal 3 (binary 0011) is added in at the beginning, instead of the end, of the routine.

(2) Decimal 10 (binary 1010), the multiplier, is written as binary 101, followed by a blank space instead of the terminal 0; so that 101 shifted one space to the left replaces 1010.

(3) The applicants take a subtotal after each successive operation, rather than the single subtotal at the end of multiplication shown above.

APPENDIX D

168 Decision of Board of Appeals, January 31, 1968 Before Kreek, Keely and Andrews, Examiners-in-Chief. Andrews, Examiner-in-Chief.

This is an appeal from the final rejection of claims 1, 2, 4 to 9, 11, 12 and 13. Subsequent to the appeal appellants directed the cancellation of claims 1, 2, 4 to 7, 9, 11 and 12, in a portion of an amendment entered 169 by the Examiner, so that the appeal as to these claims herewith is dismissed. This leaves for our consideration on appeal claims 8 and 13, which are all the claims remaining in the application. The amendments to claim 13 as proposed by the amendment of August 31, 1967, were not entered by the Examiner and will not be considered by us.

Claims 8 and 13 read as follows:

8. The method of converting signals from binary coded decimal form into binary which comprises the steps of

(1) storing the binary coded decimal signals in a reentrant shift register,

(2) shifting the signals to the right by at least three places, until there is a binary "1" in the second position of said register,

(3) masking out said binary "1" in said second position of said register,

(4) adding a binary "1" to the first position of said register,

(5) shifting the signals to the left by two positions,

(6) adding a "1" to said first position, and

(7) shifting the signals to the right by at least three

positions in preparation for a succeeding binary "1" in the second position of said register.

13. A data processing method for converting binary coded decimal number representations into binary number representations comprising the steps of

(1) testing each binary digit position 1, beginning with the least significant binary digit position, of the most significant decimal digit representation for a binary "0" or a binary "1";

(2) if a binary "0" is detected, repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;

(3) if a binary "1" is detected, adding a binary "1" at the (i + 1)th and (i + 3)th least significant binary digit positions of the next lesser significant decimal digit representation, and repeating step (1) for the next least significant binary digit position of said most most significant decimal digit representation;

(4) upon exhausting the binary digit positions of said most significant decimal digit representation, repeating steps (1) through (3) for the next lesser significant decimal digit representation as modified by the previous execution of steps (1) through (3); and

(5) repeating steps (1) through (4) until the second least significant decimal digit representation has been so processed.

Since neither of the references cited in the Examiner's Answer was applied against either claim before us on appeal, we need not consider these references.

Claims 8 and 13 stand rejected as for subject matter not embraced by 35 U.S.C. 101 in that they set forth "mental processes" and "mathematical steps,"

neither being an "art" as construed by a long line of decisions, such as:

Cochrane et al. v. Deener et al., 1877 C. D. 242, 94 U.S. 780, 11 O. G. 687

In re Abrams, 38 CCPA 945, 188 F. 2d 165, 1951 C. D. 264, 648 O. G. 663, 89 USPQ 266

Halliburton Oil Well Cementing Company v. Walker et al., 146 F. 2d 817, 64 USPQ 278

In re Yuan, 38 CCPA 967, 188 F. 2d 377, 1951 C. D. 286, 648, O. G. 967, 89 USPQ 324

In re Venner et al., 46 CCPA 754, 262 F. 2d 91, 1959 C. D. 174, 739 O. G. 812, 120 USPQ 192

Ex parte Jenny, 773 O. G. 913, 130 USPQ 318

Appellants by their brief and reply brief and at the hearing strongly urge that the instant claims should be construed to be within the statutes and that the prior decisions should not be extended to bar claims to a process even though capable of being carried out in the
171 mind where there is a disclosure in the specification that the process could be carried out also on a machine, such as a stored program electronic computer. Appellants include, as Appendix D of their brief, appellants' attorneys' comments on the proposed "Guidelines to Examination of Programs," as published in 829 O. G. 1, August 2, 1966.

We have reviewed the rejection of claims 8 and 13 against the background of the cases cited by both the Examiner and the appellants together with the comments by each and we find we are in agreement with the position of the Examiner that the appealed claims set forth subject matter not embraced by 35 U.S.C. 101 within the term "art" as interpreted in Cochrane et al. v. Deener et al., *supra*.

We are not convinced by appellants' arguments to the effect that the disclosure in an application, not the claims thereof, should be the proper basis for judging

whether the claims are drawn to subject matter outside the statute. Certainly a claim which embraces that which was already in the prior art or was obvious therefrom could not be sustained under 35 U.S.C. 102 or 103 merely because there may have been something patentable disclosed in the specification. 35 U.S.C. 112 requires the claim to point out the subject matter which the applicant regards as his invention so that a claim which is so broad and indistinct as to embrace within its terms subject matter that can not be patented under section 101 of the statue, similarly must be unpatentable.

We note particularly that claim 13 is so broad as to read on the mental activity alone of a mathema-
172 tician while carrying out a set of rules or, more precisely, an algorithm, that expresses a relation of one arbitrary system of symbolizing an abstract number to another system for symbolizing the same abstract number. There is no physical act on a physical thing suggested by this claim and it is merely the definition of a mathematical algorithm.

The fact that a mathematician may, as an aid to his memory, routinely elect to record on a suitable medium the symbols incident to his following the procedure specified by an algorithm, such as pencil and paper or other conventional computational apparatus, does not change the basic character of the process from its being an intangible, abstract line of reasoning.

In fact it is generally recognized that any algorithm suggest the use of such aids to understanding, as for example in:

Knuth "What Is An Algorithm?" *Datamation*, October, 1967, pp. 30–32

it is stated at page 31:

"So much for the form of algorithms; now let us perform one. It should be mentioned immediately that the reader *should not expect to read an algo-*

rithm like he reads a novel; such an attempt would make it pretty difficult to understand what is going on. An algorithm must be seen to be believed, and the best way to learn what an algorithm is all about is to try it. The reader should always take *pencil and paper* and work through an example of each algorithm immediately upon encountering it in the text. Usually the outline of a worked example will be given, or else the reader can easily conjure up one. This is a simple and painless method for obtaining an understanding of a given algorithm, and *all other approaches are generally unsuccessful.*" (Emphasis added).

Thus it is to be seen that denying to the mathe-
173 matician, as the appealed claims would do, access to the usual tools of his profession, such as pencil and paper or a programmable computer, is to deny him an opportunity to understand appellants' mathematical algorithm. Such denial is a restriction on mental process and is tantamount to granting a patent thereon. It is not seen how such restriction on mental processes could promote science or the useful arts.

Appellants argue that restriction of the claimed method by terms such as "signals" in claim 8 or "electrical signals," as they unsuccessfully proposed to amend claim 13, prevents the reading of the claims on mental steps.

A reading of the claims shows that the method is not a physical act on anything but is dealing with a manipulation of the *meaning* represented by signals. Note that claim 8 does not purport to operate on the physical signals themselves, but only on the *coded* form thereof and claim 13 clearly specifies operation on the *representation* in coded form.

The *coding* of or the *representation* made by an arrangement of signals is, itself, merely a mental interpretation and has significance only where there

is a prearranged understanding of some meaning or thought to be expressed and these vary with the person involved. For example, a series of four successive vertical marks or "ones," to a tally clerk, means a count of *four;* to a student of decimal arithmetic, means the decimal number *1,111;* to a programmer of an octal
174 computer, means *17* and to a programmer of a hexadecimal computer means *F or 15.* Thus a method, as here, which deals with manipulations of the meanings or representations made by signals is a method of manipulating mental concepts and not of physical things.

Claim 8 specifies the step of storing signals in a "shift register." This requires no more than the writing of the symbols constituting the augend on a piece of paper as an aid to one's memory since the paper can be shifted right or left any number of intervals so as to align the augend with a fixed position of the addend. Furthermore it is a trivial choice in the programming of a computer whether the relative shifting is accomplished by use of the conventional shift register for the augend or by modification of the relative address in the instruction directing the addition of the addend, as is also routine. The relative efficiency of either choice to a mathematician or programmer would be obvious from the computer employed.

Since this Board is of the opinion that the methods here claimed are non-statutory, consonant with a long line of decisions, it doubts the wisdom of here attempting to arrive at an opposite conclusion as to the same statute solely on the basis of an ex parte showing of advantage.

For the reasons set forth above as well as for the reasons advanced by the Examiner, the rejection of claims 8 and 13 is sustained.

175 The decision of the Examiner is affirmed.

AFFIRMED